

Lake St. Clair Smallmouth Bass Update

The goal of this summary is to provide interested Michigan sport anglers with a concise review of all available quantitative data relative to the status of smallmouth bass in Lake St. Clair. Sources of information in this report include Michigan Department of Natural Resources (MDNR) Master Angler program, angler diary program, creel survey, assessment trap net survey, assessment trawl survey, and reported tag recoveries. Some of the data presented have been recently reported in the MDNR report "Status of the Fisheries in Michigan Waters of Lake Erie and Lake St. Clair, 2002" (available on the web at: http://www.michigan.gov/documents/Mt_Clemens_status2002_59852_7.pdf). In other cases, data included in this summary have been previously reported in MDNR research reports or annual federal aid study performance reports. Finally, some of the most recent data have not previously been reported.

Master Angler Program: Statistics from the Master Angler program indicate that Lake St. Clair is the premier waterbody in the state for trophy smallmouth bass. Lake St. Clair accounted for 23% of all smallmouth bass entries in the statewide program in 2002 (catch/keep and catch/release programs combined). Crystal Lake (Benzie County), Grand Traverse Bay (Grand Traverse County), and Mullett Lake (Cheboygan County) ranked second in total entries with 5% for each waterbody. The total number of entries from Lake St. Clair increased in 2002, but remained below the peak level of 20 entries in 1999 (Figure 1). Since the early 1990's, both catch/keep and catch/release Master Angler smallmouth bass entries from Lake St. Clair have exhibited an increase. Catch/release entries have outnumbered catch/keep entries for the last three years. The strong representation of Lake St. Clair smallmouth bass in the statewide Master Angler Program indicates an abundance of trophy-size smallmouth bass in the lake, a high degree of angler effort targeting the species, and a strong catch-and-release ethic among Lake St. Clair smallmouth bass anglers.

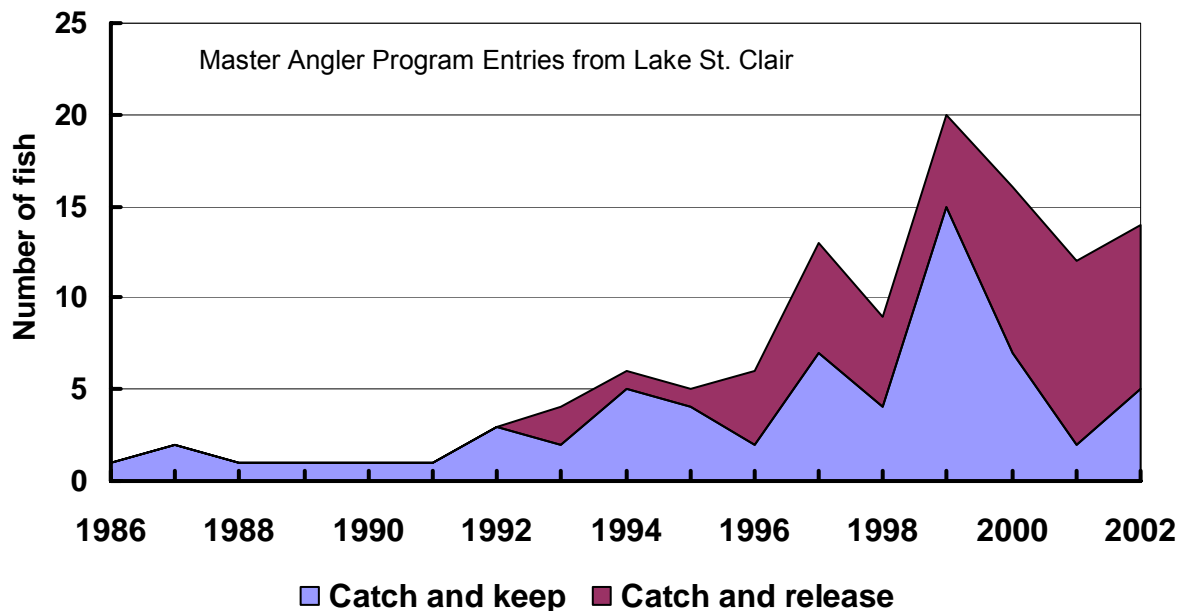


Figure 1. –Lake St. Clair smallmouth bass entered in the Michigan DNR Master Angler Program, 1986-2002. Values for 1992-2002 represent combined regular and catch-and-release Master Angler categories.

Angler Diary Program: Since 1993, the MDNR has supported an Angler Diary Program in conjunction with the Ontario Ministry of Natural Resources. In 2002, the MDNR distributed 74 angler diaries to Michigan resident sport anglers interested in participating in the diary program. A total of 47 diaries were returned by cooperating anglers during fall and early winter. Cooperating anglers recorded data from 153 trips targeting smallmouth bass on Lake St. Clair in 2002 (Table 1). The catch rate for 2002 was the 2nd highest for the time series. The percent of smallmouth caught and kept by volunteers in the angler diary program has declined in recent years, a trend that matches the Master Angler Program trend of increasing catch/release entries from Lake St. Clair. Participation in the Angler Diary Program has declined since the mid-1990's, thus numbers of trips and total effort levels for smallmouth bass have declined. These numbers are not believed to reflect a true trend in angling effort for smallmouth bass on Lake St. Clair.

Table 1.—Targeted angler effort, catch, and catch rates for smallmouth bass from the Lake St. Clair sport fishing diary program.

Year	Trips seeking	Effort (rod-hours)	Number caught	Number kept	Percent kept	Catch per rod-hour
1993	255	3,284	1,376	584	42%	0.42
1994	237	2,485	995	352	35%	0.40
1995	228	2,069	1,008	269	27%	0.49
1996	153	1,537	545	190	35%	0.35
1997	143	1,375	687	148	22%	0.50
1998	127	1,248	495	94	19%	0.40
1999	222	1,841	1,112	204	18%	0.60
2000	190	1,126	1,484	126	8%	1.22
2001	74	512	280	48	17%	0.55
2002	153	1,207	954	110	12%	0.79

Lake St. Clair Creel Survey – 2002: An on-site creel survey conducted by the MDNR produced a total harvest estimate of 537,889 fish (Table 2) for Michigan's 2002 Lake St. Clair sport fishery. Yellow perch and walleye dominated the harvest, accounting for 92% of the total in combination. Smallmouth bass ranked third in the estimated harvest with a season total of 12,099 fish. Monthly smallmouth bass harvest estimates were fairly consistent from July to September, then dropped drastically in October. Bass harvest in June 2002 was restricted by a closed season that extended through June 15th, the third Saturday of the month. Thus, the June harvest estimate of 1,182 fish actually represented the estimated harvest for the last two weeks of June. The last on-site creel survey of the Michigan Lake St. Clair sport fishery was conducted in 1983-84 (Haas et al 1985). The estimated average annual sport fishing effort on Lake St. Clair was 1,730,104 angler hours. The 2002 effort estimate of 1,368,564 represents a 21% decline in total fishing effort compared to the earlier time period. In 1983-84, the average annual smallmouth bass harvest for the open water fishery was estimated at 22,130 fish per year, nearly double the 2002 smallmouth bass harvest estimate. Factors in the lower smallmouth bass harvest in 2002 likely include the higher minimum size limit (increased from 12" to 14" in 1995), increased catch/release fishing for bass in recent years, and lower total angler effort in 2002.

Biological data were recorded for 413 smallmouth bass by on-site creel survey personnel. The age distribution of harvested smallmouth bass was heavily dominated by the 1998 (age 4) year class (Figure 2), which accounted for 51% of the total. The 1999 year class (age 3), and 1997 year class (age 5) combined for another 27% of the total harvest. The length frequency distribution illustrates the dominance of 14 and 15 inch fish in the harvest. Approximately 67% of the harvested smallmouth bass were less than 16 inches in total length. Despite a minimum size limit of 14 inches, about 6% of the harvested smallmouth bass measured by the creel survey personnel were sub-legal size.

Table 2.—Estimated effort and harvest (non-targeted) for the Michigan sport fishery on Lake St. Clair, March-October, 2002.

Species	Harvest per hour	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Season
Yellow perch	0.3329	329	6,388	4,916	76,269	124,760	71,284	135,456	36,219	455,621
Walleye	0.0307	110	314	987	7,716	10,838	15,065	6,216	726	41,972
Smallmouth bass	0.0088	0	0	0	1,182	3,279	3,373	4,066	199	12,099
Bluegill	0.0074	14	718	1,008	3,096	2,017	1,229	1,297	695	10,074
Rock bass	0.0062	0	123	292	3,936	1,492	1,526	1,015	123	8,507
Others	0.0071	50	588	1,045	2,876	2,581	925	1,097	454	9,616
All species	0.3930	503	8,131	8,248	95,075	144,967	93,402	149,147	38,416	537,889
Angler hours		2,479	16,221	61,320	368,348	396,657	251,320	219,056	53,163	1,368,564
Angler trips		850	3,839	13,118	70,134	76,294	43,951	41,249	11,445	260,880
Angler days		824	3,622	12,186	67,825	74,662	43,592	40,342	11,222	254,275

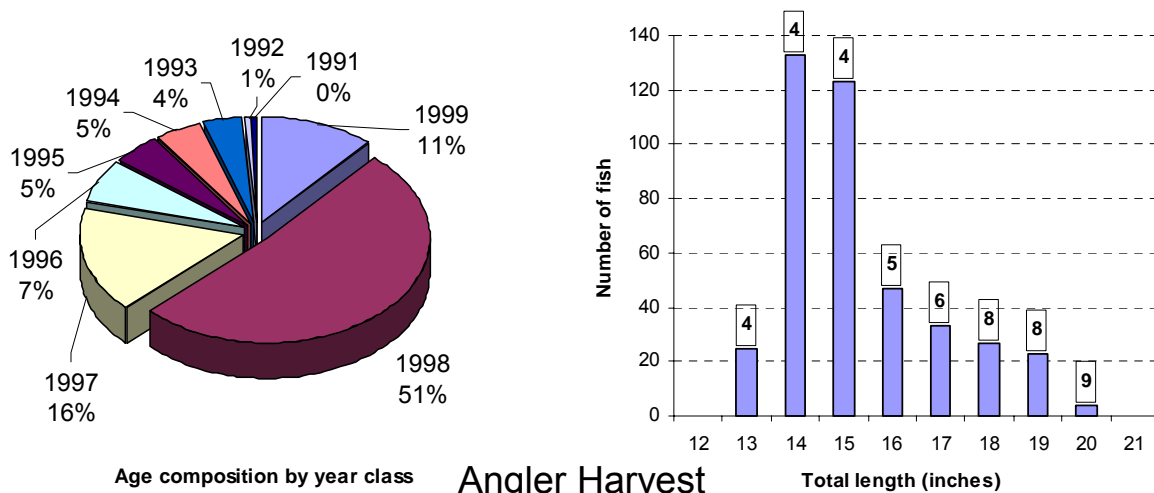


Figure 2.—Age composition (expressed as percent of total catch, n=413) and length frequency distribution by inch-group for smallmouth bass harvested by the Lake St. Clair sport fishery in 2002. Length frequency distribution also displays average age by inch-group in boxes above the bars.

Assessment Trap Net Survey: Survey trap nets were fished in Anchor Bay during May, 2002 to capture predator fish species and collect biological data on their populations. A total of 64 net lifts captured 120 northern pike, 41 muskellunge, 400 smallmouth bass, 23 largemouth bass, and 243 walleye. Monel metal jaw tags were applied to the jaw of all smallmouth bass exceeding 13 inches in total length. A total of 272 smallmouth bass were tagged and released at the site of capture. The trap net smallmouth bass age composition was dominated by the 1998 year class, which accounted for 70% of the total catch (Figure 3). The next most abundant year class was the 1997 year class, which accounted for 8% of the total catch. The length frequency distribution suggests that most of the 1998 year class fish were sub-legal in 2002. The most abundant inch-group in the trap net catch was 13-inch fish, which were 4 years old on average (1998 year class). Most of these fish should exceed the minimum size limit by June 2003.

Scott and Crossman (1973) reported that smallmouth bass spawning occurs over a range of temperatures from 55 - 68 °F, but that egg deposition takes place at 61 – 65 °F. Latta (1954) observed that smallmouth bass nesting began on May 31, 1953, at a water temperature of 59 °F, in Muscamoot Bay, Lake St. Clair. Water temperatures in Anchor Bay during May 2002 remained below 55 °F through May 24 (Figure 5). Only three ripe males were caught before May 23. The first ripe females were caught in the trap nets on May 28.

In the 1970's and 80's the MDNR surveyed smallmouth bass with the same assessment trap nets at the same location in Anchor Bay (Bryant and Smith 1988). Mean length and catch rate data from 2002 can be directly compared with data from the earlier studies. Mean lengths for ages 3, 4, 5, and 6 were higher in 2002 than for any year during the studies in the 70's and 80's (Table 3). In 2002, smallmouth bass were about an inch longer at any given age than during the earlier time period. Total catch rate, or number of smallmouth bass caught per net lift, in 2002 was lower than for any year of the survey in the 70's and 80's. This could be a function of weather conditions during the survey period in 2002, or it may reflect lower smallmouth bass abundances at the trap net site. Age specific catch rates (Table 4) illustrate a consistent pattern across most survey years of peak catch rates for age 4 fish, with 2002 following that pattern. The unusually high contribution of age 9 and older fish in 2002, suggests that the proportion of old individuals in the population may be much higher in 2002 than at any time during the early study.

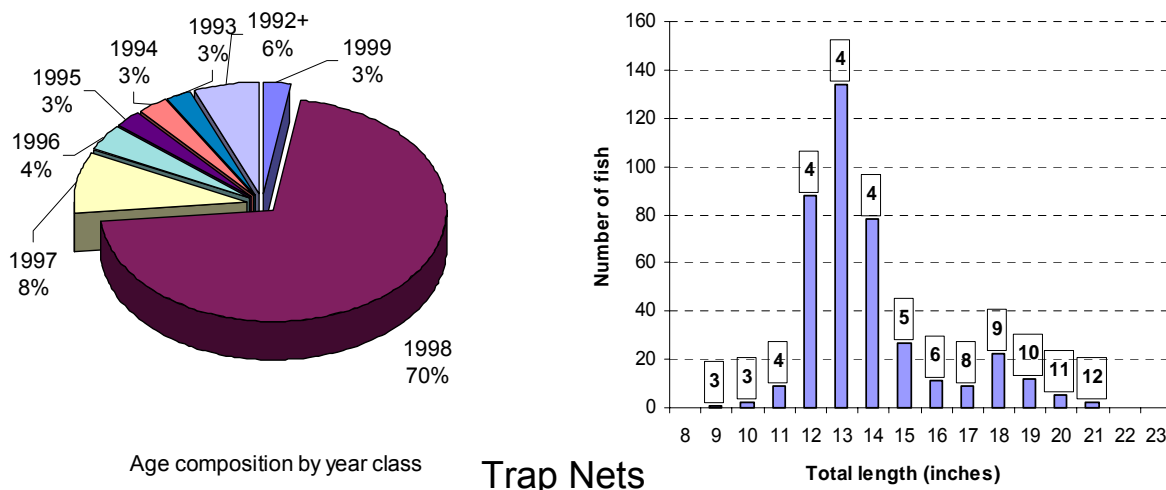


Figure 3.—Age composition (expressed as percent of total catch, n=400) and length frequency distribution by inch-group for smallmouth bass caught in survey trap nets in Anchor Bay, May, 2002. Length frequency distribution also displays average age by inch-group in boxes above the bars.

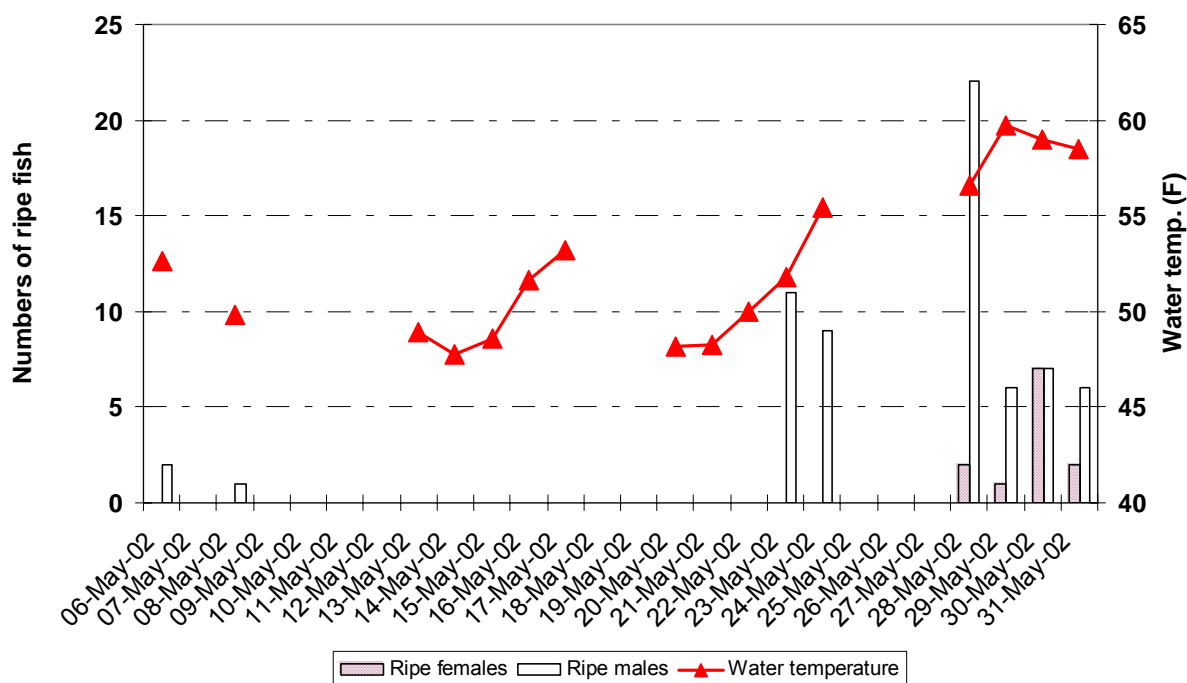


Figure 4.–Water temperatures (°F) and numbers of ripe smallmouth bass males and females caught in survey trap nets in Anchor Bay in May 2002.

Table 3.–Mean length at age for smallmouth bass from Anchor Bay trap nets (Len represents total length expressed in inches; SS represents sample size expressed as number of fish).

Year	Age 3		Age 4		Age 5		Age 6		Age 7		Age 8		Age 9		Age 10	
	Len	SS	Len	SS	Len	SS	Len	SS	Len	SS	Len	SS	Len	SS	Len	SS
1972	10.7	39	12.6	66	14.1	50	15.4	12	16.7	5	17.4	3	17.4	1	18.9	1
1973	10.2	71	11.3	165	13.1	94	14.8	27	16.2	19	16.5	2	0.0			
1974	10.2	113	11.7	252	12.9	179	14.8	51	15.6	22	17.2	4	19.1	1		
1975	9.9	8	11.4	187	13.1	138	14.6	51	16.0	24	17.2	4	18.5	5	18.9	2
1977	10.2	13	11.9	160	12.8	29	14.3	48	15.5	29	16.8	7	15.4	3	18.8	1
1978	10.9	35	12.4	87	13.6	158	14.7	11	15.8	6	16.6	2	0.0			
1979	10.5	171	12.2	208	13.5	74	14.8	116	16.2	19	16.3	10	17.2	7	17.7	1
1980	10.4	154	11.9	123	13.4	48	14.9	16	15.5	20	16.3	9	15.5	1	16.5	1
1981	10.4	83	11.9	678	13.1	193	14.7	44	16.5	10	16.5	11	17.1	3		
1983	10.5	194	12.2	315	13.5	154	14.6	231	15.7	43	16.4	1	17.0	4	19.0	1
1984	10.8	637	12.6	774	14.0	326	15.4	142	16.3	116	17.1	13	18.0	6	18.2	5
1985	10.5	132	12.2	943	13.9	394	15.1	136	16.3	48	16.9	35	17.8	11	18.6	7
72-85 avg	10.6		12.1		13.5		14.8		16.1		16.8		17.5		18.5	
2002	12.0	10	13.5	278	14.4	33	16.0	16	16.6	10	17.9	11	18.6	10	19.1	12
Diff. (in)	+1.5		+1.3		+0.9		+1.1		+0.5		+1.1		+1.1		+0.6	

Table 4.—Age specific catch per net lift for smallmouth bass in Anchor Bay assessment trap net surveys. Total CPUE represents the combined Age 2 through Age 13 catch per net lift values. Age 9+ is the catch per net lift for age groups 9, 10, 11, 12, and 13.

Age	Sample year												
	1972	1973	1974	1975	1977	1978	1979	1980	1981	1983	1984	1985	2002
2	0.05	—	—	0.01	0.07	0.09	0.05	—	0.07	0.04	0.15	0.07	—
3	1.97	1.66	1.62	0.16	0.48	3.09	4.55	20.64	2.87	3.12	8.16	2.93	0.16
4	2.89	3.86	3.66	3.21	7.96	7.44	5.89	14.34	24.12	5.19	10.19	16.91	4.42
5	2.26	2.20	2.64	2.43	1.31	12.76	2.11	5.20	6.80	2.19	4.35	6.33	0.52
6	0.56	0.61	0.81	0.90	1.85	0.94	3.12	1.71	1.53	3.60	2.00	2.21	0.25
7	0.22	0.43	0.36	0.42	0.99	0.59	0.49	2.12	0.34	0.68	1.67	0.81	0.16
8	0.17	0.04	0.06	0.08	0.19	0.24	0.26	0.97	0.37	0.02	0.19	0.59	0.17
9	0.05	—	0.02	0.07	0.13	—	0.18	0.11	0.10	0.07	0.11	0.18	0.16
10	0.09	—	—	0.03	0.03	—	0.02	0.11	—	0.01	0.08	0.11	0.19
11	—	—	—	0.02	—	—	—	—	—	—	0.00	—	0.10
12	—	—	—	—	—	—	—	—	—	—	0.01	—	0.06
13	—	—	—	—	—	—	—	—	—	—	—	—	0.03
9+	0.14	0.00	0.02	0.12	0.16	0.00	0.20	0.22	0.10	0.08	0.20	0.29	0.54
Total CPUE	8.26	8.80	9.17	7.33	13.01	25.15	16.67	45.20	36.20	14.92	26.91	30.14	6.23
Mean age	4.41	4.36	4.44	4.86	4.69	4.56	4.43	4.02	4.27	4.58	4.24	4.47	4.87

Assessment Trawl Survey: The MDNR has conducted fall trawls in Anchor Bay each September, since 1996. Adult smallmouth bass are likely good at avoiding capture in trawls, but the young-of-year, or age 0 smallmouth bass are too small to effectively avoid the trawling gear. Fall densities of age 0 smallmouth bass could be a measure of the reproductive success for smallmouth bass within that year. The highest fall densities observed occurred in 1999 and 2002 (Figure 5). However, average length of age 0 fish may be a better indicator of their probability of survival through the coming winter (Fullerton et al. 2000). Average length of the age 0 smallmouth bass caught in Lake St. Clair fall trawls has varied considerably across years. Age 0 smallmouth bass in 1998 were significantly larger than those caught in any other year. Poorest growth of Age 0 smallmouth was observed in 1997 and 2002.

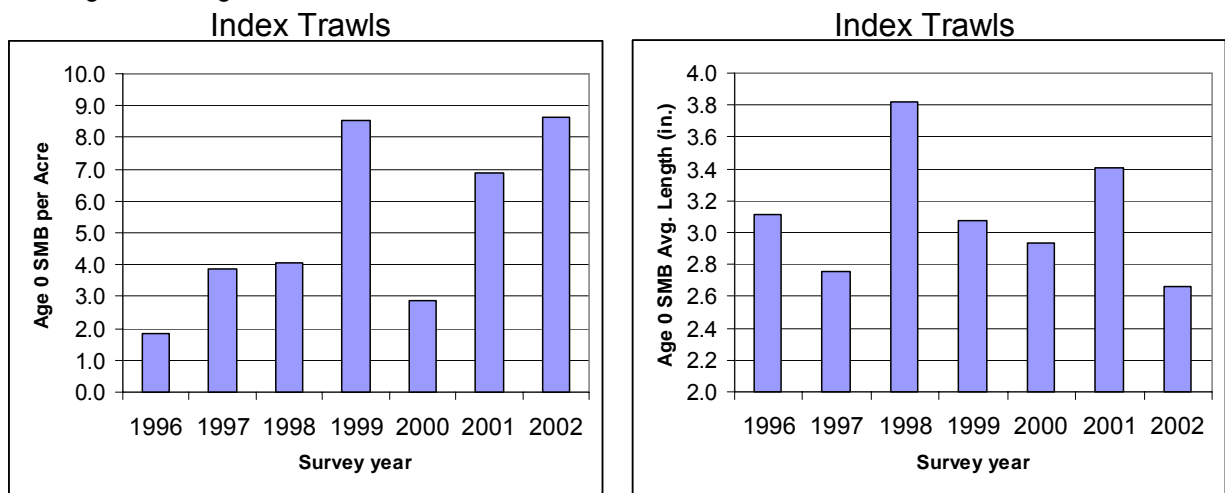


Figure 5.—Densities (number per acre) and average total length (inches) for age 0 smallmouth bass in Lake St. Clair fall index trawls, 1996 – 2002.

Smallmouth Bass Tagging Study: The MDNR began a tagging study of smallmouth bass in Lake St. Clair in 2002. The purpose of the study is assess exploitation, survival, and movement of smallmouth bass in Lake St. Clair. Results of this study will be comparable with a similar study conducted in the early 1980's (Bryant and Smith 1988). In 2002, a total of 272 smallmouth bass caught in trap nets in Anchor Bay were tagged and released. Through April 2003, only 12 recaptures were reported by anglers. Eleven of the recaptures were reported from the northern portion of Lake St. Clair (Figure 6). One tag recovery was reported from the St. Clair River at Port Huron. This pattern of tag recoveries, though low in number at this time, closely resembles the pattern observed in the earlier tag study of Anchor Bay smallmouth bass.

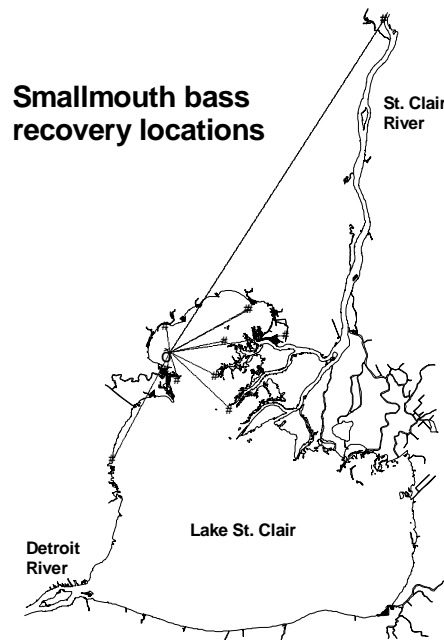


Figure 6.—Geographical distribution of 12 smallmouth bass tags recovered by anglers fishing in Lake St. Clair and the St. Clair River during the 2002 season.

References:

- Bryant, W. C. and K. D. Smith. 1988. Distribution and population dynamics of smallmouth bass in Anchor Bay, Lake St. Clair. Michigan Department of Natural Resources, Fisheries Research Report 1944, Lansing.
- Fullerton, A.H., J.E. Garvey, R.A. Wright, and R.A. Stein. 2000. Overwinter growth and survival of largemouth bass: interactions among size, food, origin, and winter severity. *Transactions of the American Fisheries Society* 129:1-12.
- Haas, R. C., W. C. Bryant, K. D. Smith, and A. J. Nuhfer. 1985. Movement and harvest of fish in Lake St. Clair, St. Clair River, and Detroit River. Michigan Department of Natural Resources, Final Report, Winter Navigation Study, U. S. Army Corps of Engineers.
- Latta, W.C. 1954. Some observations on the spawning of the smallmouth bass, *Micropterus dolomieu*, in Lake St. Clair during the spring of 1953. Michigan Department of Natural Resources, Fisheries Research Report No. 1419. Ann Arbor.
- Scott, W. B. and E. J. Crossman. 1973. *Freshwater Fishes of Canada*. Bulletin 184. Fisheries Research Board of Canada. Ottawa.